

# Tangerine

by *Nicholas Chen*



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ARTSTUDI 260 S13

In designing Tangerine, I wanted to explore the power of expression — to give the inanimate a feeling of aliveness. My goal was to imply, from a distance, a sense of playfulness, comfort, and elegance. To do so, I used a warm color palette and an organic visual style to bind an otherwise unconventional pairing of wood and fiberglass.



preliminary sketches

"HARP"

ORANGE

ideation

seat fab

base fab

assembly

# aluminum foil prototype



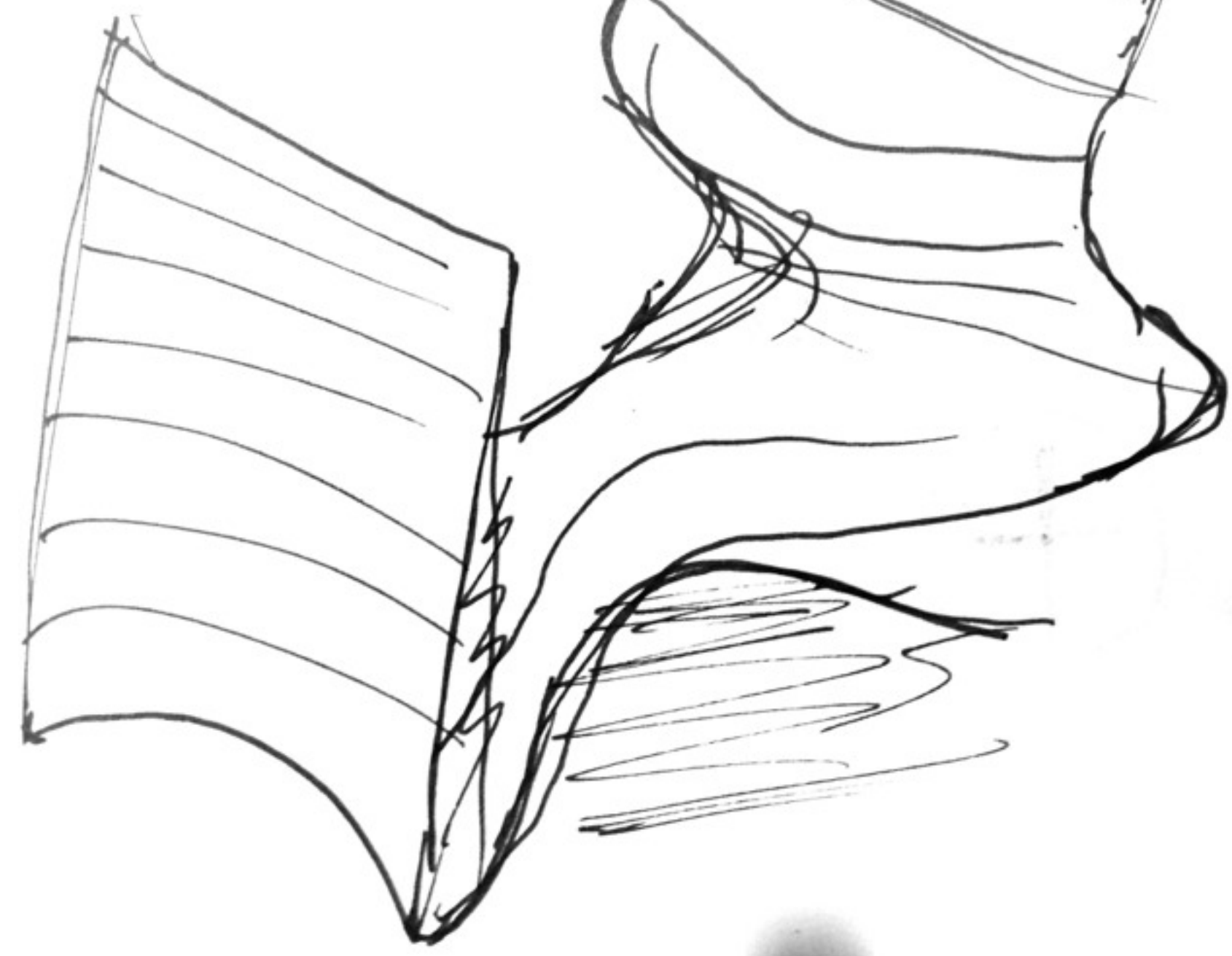
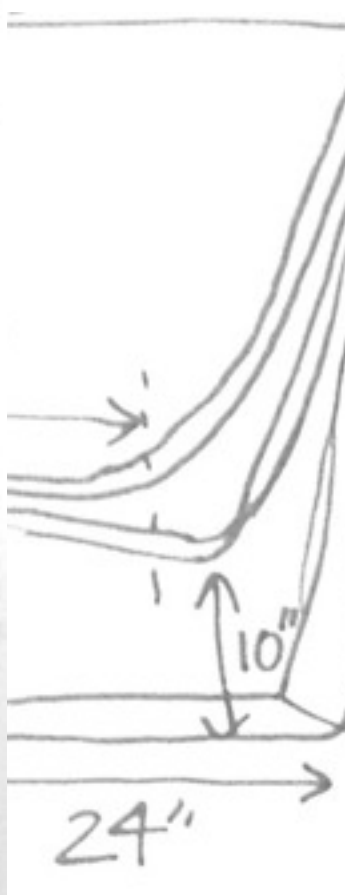
ideation

seat fab

base fab

assembly

refined sketches



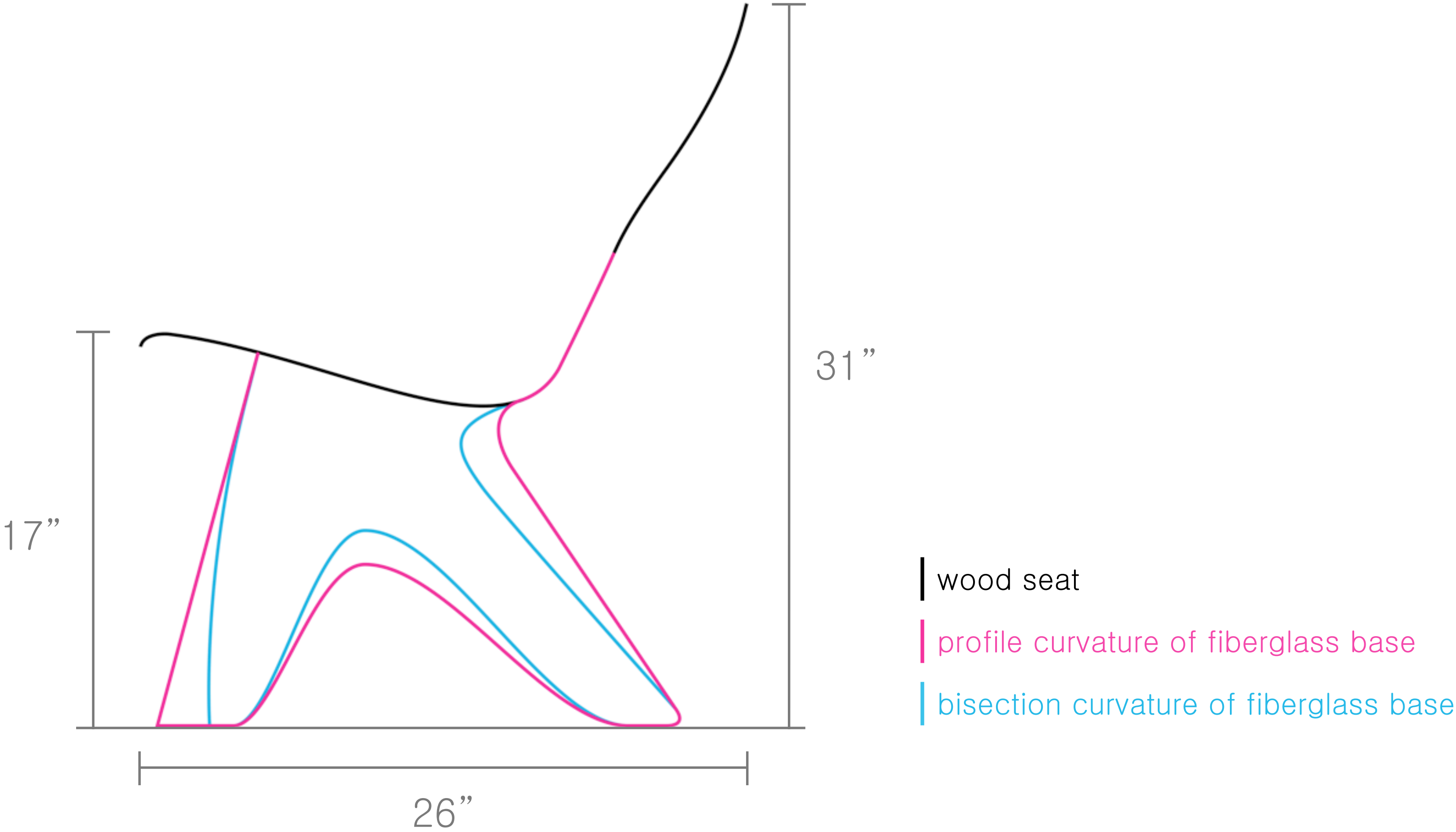
ideation

seat fab

base fab

assembly

# vector drawing of final design



ideation

seat fab

base fab

assembly

# masonite + scrap wood sits-like prototype

laser cut masonite joined by scrap wood with wood glue



Making a sits-like prototype was an effective way of validating the ergonomics of my design before beginning the more labor-intensive process of making the MDF seat buck.

ideation

seat fab

base fab

assembly

# quick tip

Ask people to help you when assembling something like this. The slow hardening time of wood glue and the large number of pieces made what seemed like a very simple prototype nearly impossible to put together by myself.



ideation

seat fab

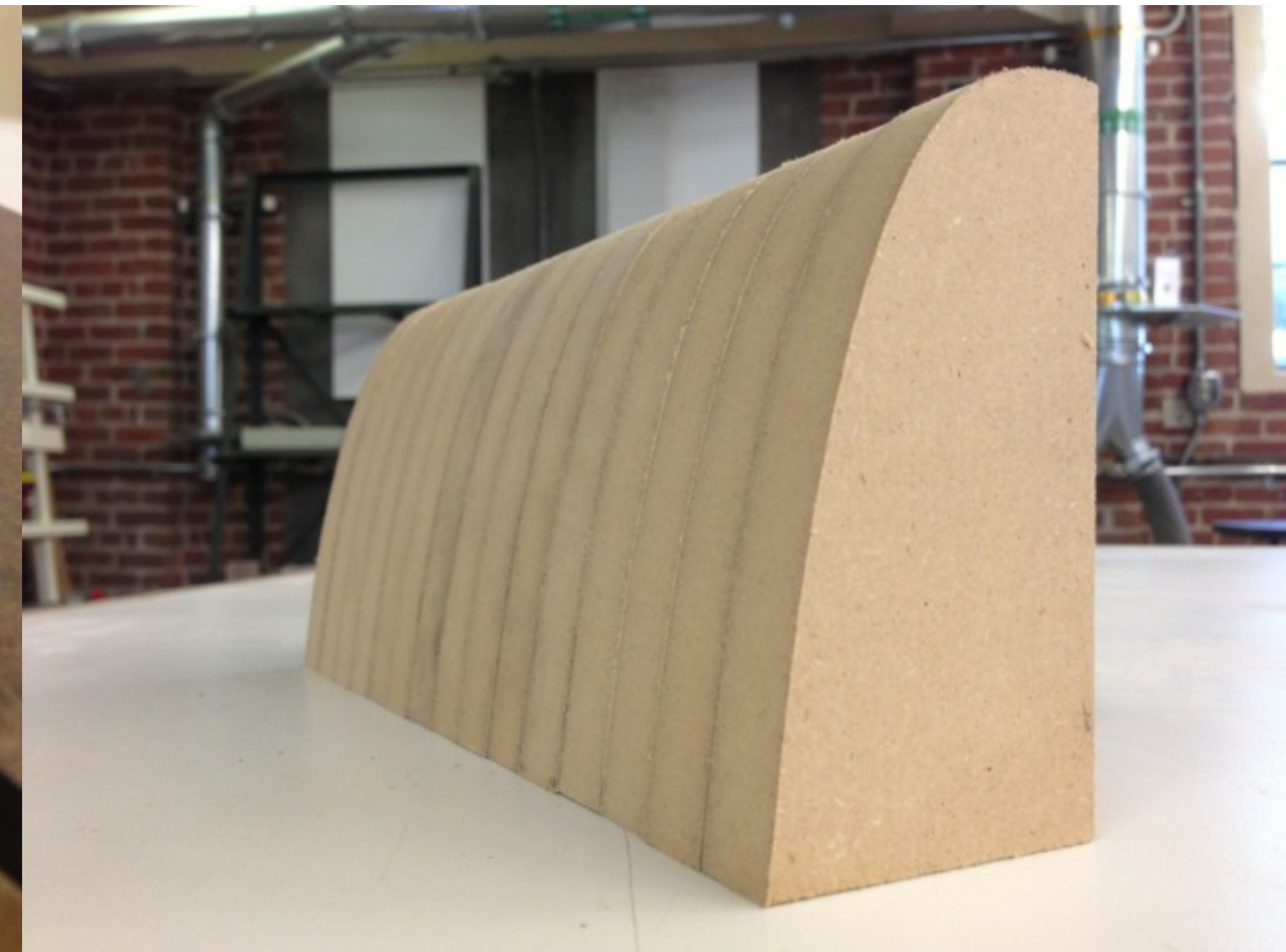
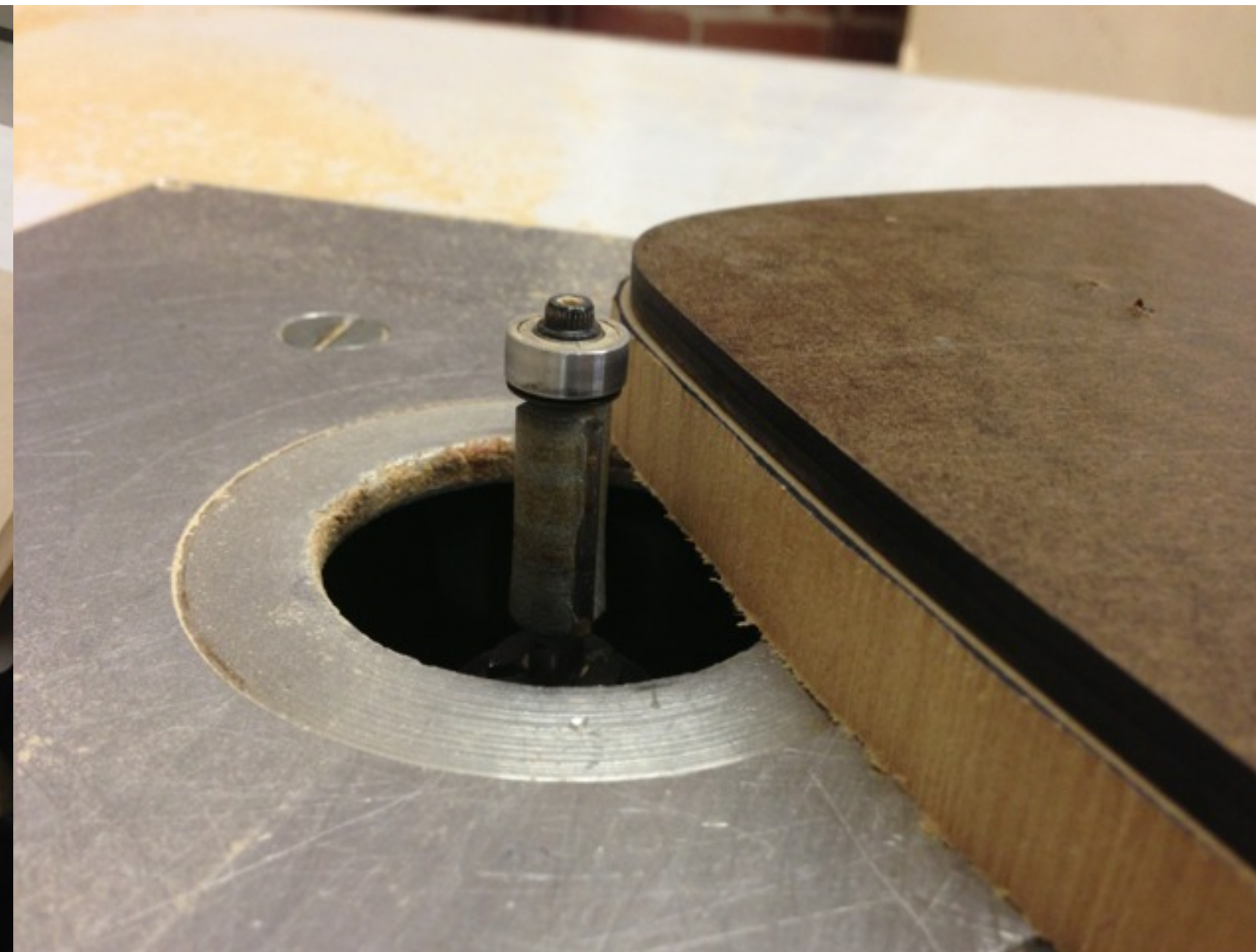
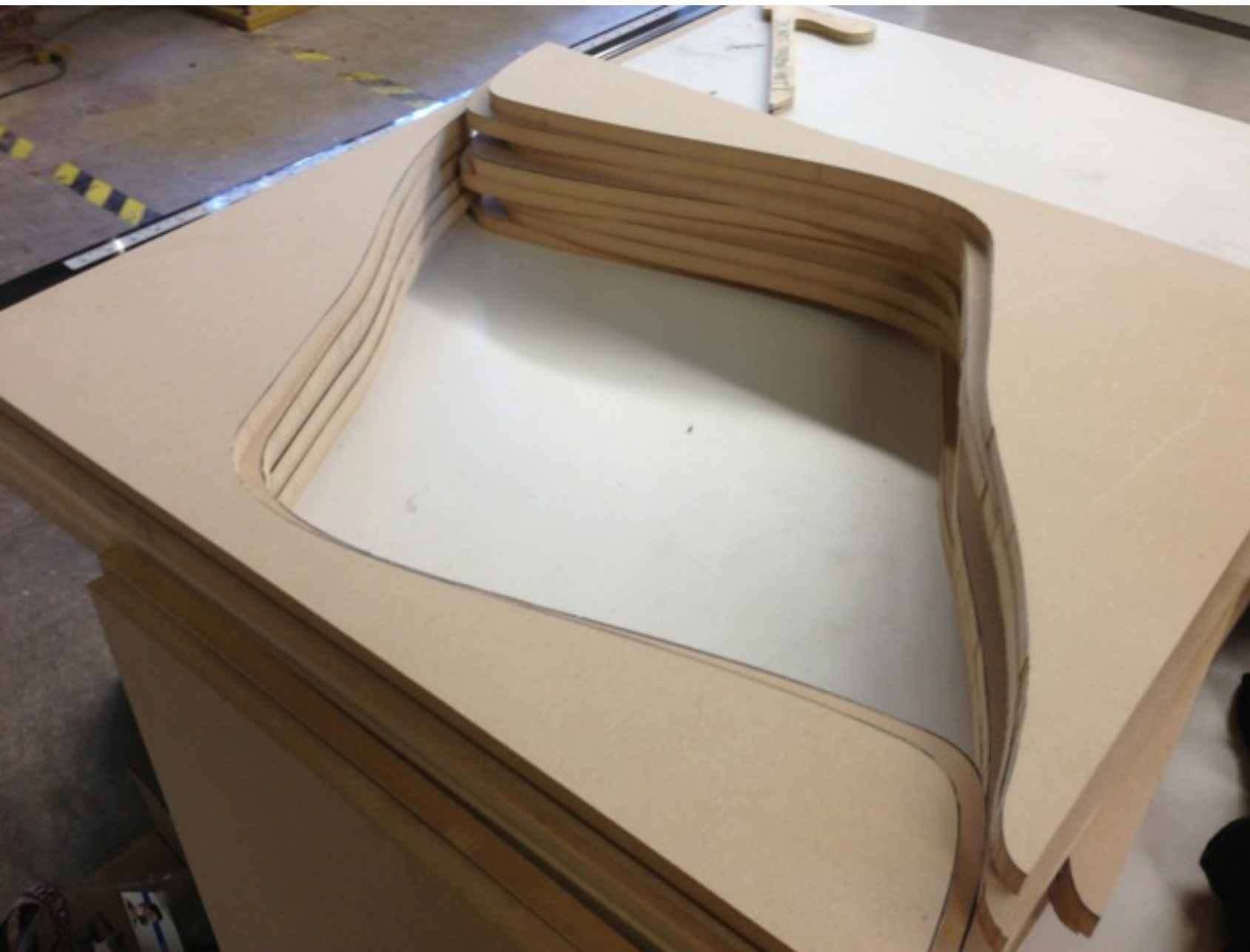
base fab

assembly



# 5/8" MDF ribs routed to spec

rough cut with bandsaw; routed using masonite template (attached with brad nails)



ideation

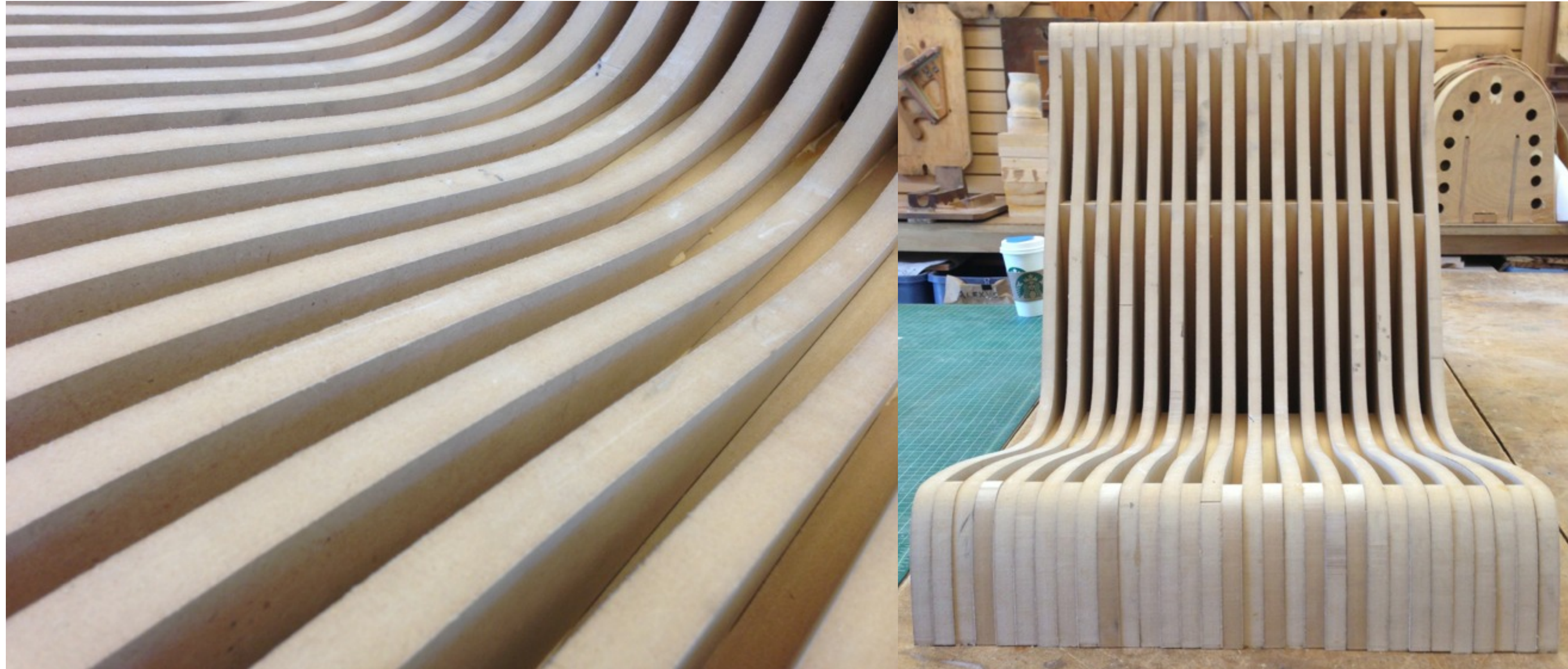
seat fab

base fab

assembly

# MDF ribs joined to create seat buck

joined with wood glue and brad nails



ideation

seat fab

base fab

assembly

# a crude layup

Ready for the layup, I tucked the seat buck into a vacuum bag with a stack of epoxied maple veneers. However, disaster struck when a sharp corner of the veneers punctured the vacuum bag, thereby breaking the airtight seal. The veneer layup had to be pressed against the buck with cinder blocks and clamps instead.



quick tip

Round the corners of veneer sheets, if possible.



ideation

seat fab

base fab

assembly

# salvaging a failure

Despite the lack of vacuum pressure, the veneers still managed to form rather tightly to the curve of the buck. The surprising success was a testament to the quality of these two-ply maple veneers from MacBeath Hardwood Co.

Still, the unevenly distributed pressure during the curing period created gaps between the veneers that had to be repaired with additional epoxy.



ideation

seat fab

base fab

assembly

# base buck

masonite templates attached to foam with double-sided tape; planar cut made by tracing templates with a hot wire cutter; complex curves created with surface former; buck wrapped in clear duct tape for easier release of fiberglass



ideation

seat fab

base fab

assembly

## my two worst enemies: gravity + core mat

The fiberglass layup proved to be challenging because of the buck's acute angles, which frequently caused the wet fiberglass sheets to detach from the buck. Additionally, core mat's resistance to conforming to complex curves created many air pockets that undermined the structural integrity of the base.



fiberglass draped over  
the buck at an angle

complete layup

Matters were made worse with my poor choice of epoxies. Rather than use one type throughout the layup, I decided to first use the discounted epoxies in the PRL cabinet, some of which did not create a strong enough bond between layers.

ideation

seat fab

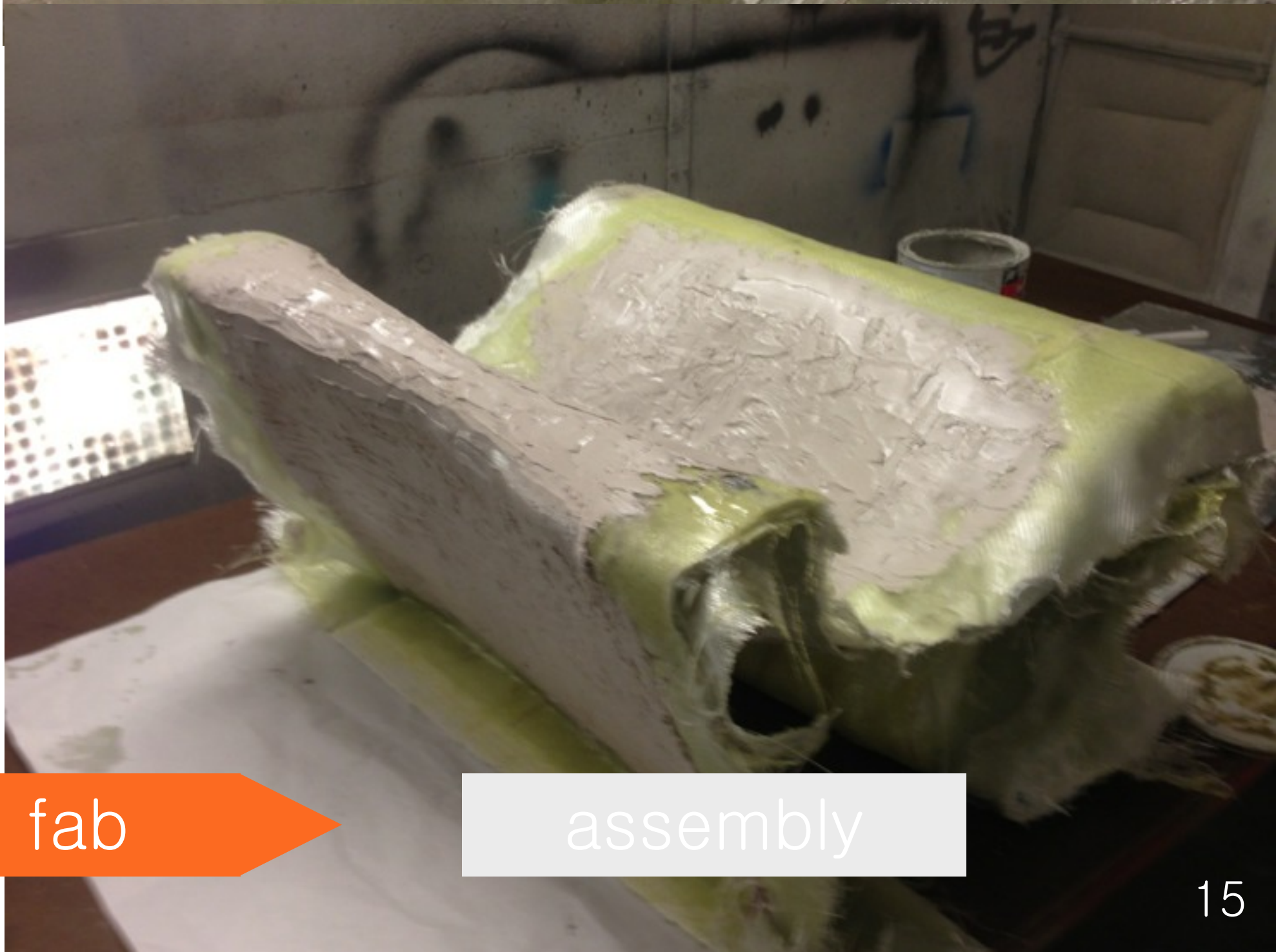
base fab

assembly

# fiberglass tape reinforcement + Bondo

The end result was a flimsy base that could not sit upright. To strengthen the layup, I added fiberglass tape and additional fiberglass layers at every structurally critical curve. While doing so, I had to use a cup as a wedge to keep sections of the base from collapsing on each other.

I then applied Bondo liberally across all outward-facing sides to smooth the fiberglass surface, which was made uneven by the folds and air pockets in the core mat layers below.



ideation

seat fab

base fab

assembly

## quick tip

When constructing complex fiberglass shapes, I would advise against using core mat in the fiberglass layup. Unless it is possible to cut a precise pattern that drapes cleanly over the buck, the core mat will fold over itself, creating air bubbles and uneven surfaces for the fiberglass layers above.

## quick tip

Don't skimp on epoxy. Choose a reliable brand and use it consistently throughout the manufacturing process.

ideation

seat fab

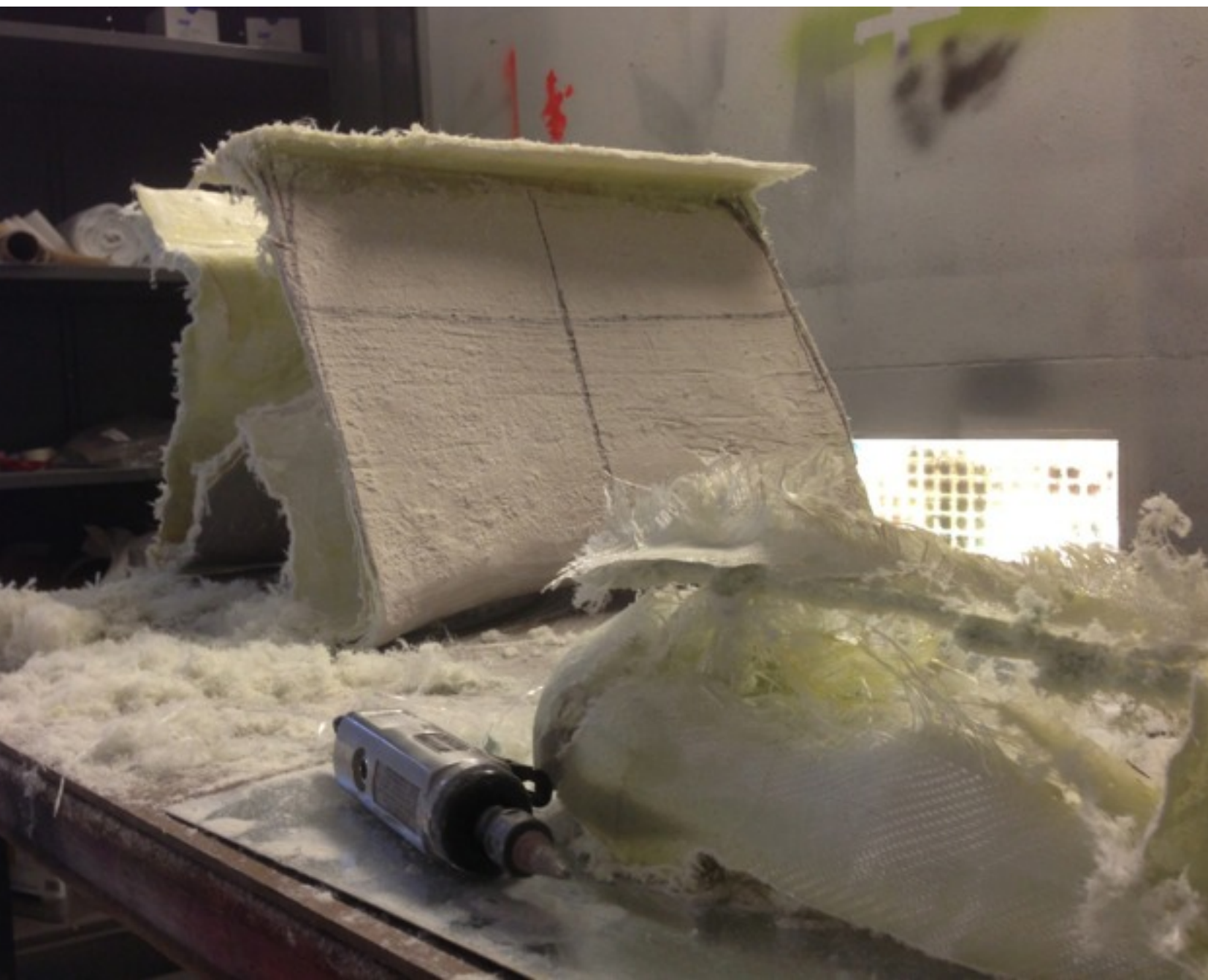
base fab

assembly



# trimming: more art than precision

rough cut and sanded with Dremel tools (curves drawn by hand, symmetry judged by hand + eye)



ideation

seat fab

base fab

assembly

# assembly



In my first attempt to attach the seat to the base, I used RTV (room temperature vulcanizing) silicone. Within 24 hours, the seat had detached entirely from the base.



My second attempt was far more successful. I used 30-minute epoxy rather than RTV silicone, and the seat was able to remain at the proper angle.

ideation

seat fab

base fab

assembly

# bill of materials

material	quantity	source	cost
MDF	2 @ 5/8" x 4' x 8'	The Home Depot	\$75
maple veneers	2 @ 4' x 8'	MacBeath Hardwood Co.	\$160
foam	1 @ 24" x 24" x 28"	Foam Distributors, Inc.	\$50
fiberglass	1 @ 1 yd x 10 yd	TAP Plastics	\$103
core mat	1 @ 1 yd x 7 yd	TAP Plastics	\$72
epoxy	a lot	TAP Plastics + PRL	\$265
Bondo	1 gallon	Ace Hardware	\$25

## bill of materials



\$750.

does not include cost of tools and smaller purchases

Sourcing quality materials takes time, but it's well worth the effort. Had I not spent a considerable amount on two-ply maple veneers, the layup for my seat would have been potentially more disastrous and not salvageable. The only purchase I regret making is the core mat. In its place, I would have purchased more fiberglass. The total cost would have been greater, but the structural integrity of the chair would have ultimately been far superior.



## I failed.

Through a series of mishaps, I managed to construct a chair that cannot be used. While I was initially frustrated, it didn't take long for me to find solace in the fact that I learned two new manufacturing processes. The project was admittedly overambitious, given the time constraints, but I'm happy to say I'm now equipped with knowledge regarding plywood bending and fiberglass construction.

I owe many thanks to John, who demonstrated such genuine enthusiasm (and concern) for my project. His dedication to this class was inspiring.

I also want to thank Anja, Eric, and my fellow classmates for offering valuable advice and emotional support throughout the process. I would not have made it nearly this far without this wonderful community.